Empowering patients with heart failure and their caregivers: Development and usability of the "My Voice" advance care planning website

Chetna Malhotra, Alethea Yee, Chandrika Ramakrishnan, Sanam Naraindas Kaurani, Ivy Chua, Joshua R Lakin, David Sim, Iswaree Balakrishnan, Vera Goh Jin Liang, Huang Weiliang, Ling Lee Fong, Kathryn I Pollak

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Chetna Malhotra[1]; Alethea Yee[2]; Chandrika Ramakrishnan[3]; Sanam Naraindas Kaurani[3]; Ivy Chua[3]; Joshua R Lakin[4]; David Sim[5]; Iswaree Balakrishnan[6]; Vera Goh Jin Liang[7]; Huang Weiliang[8]; Ling Lee Fong[9]; Kathryn I Pollak[10]

[1]National Cancer Centre Singapore Singapore SG
[2]Duke NUS Medical School Singapore SG
[3]Dana Faber Cancer Institute Boston US
[4]National Heart Centre Singapore Singapore SG
[5]Sengkang General Hospital Singapore SG
[6]Singapore General Hospital Singapore SG
[7]Changi General Hospital Singapore SG
[8]Khoo Teck Phuat Hospital Singapore SG
[9]Duke University, School of Medicine Durham US

Corresponding Author:
Chetna Malhotra

Abstract

Background: Web-based advance care (ACP) interventions offer a promising solution to improve ACP engagement. However, there is lack of web-based ACP decision aids tailored for patients with heart failure, incorporating mechanisms to revisit patients’ care goals, and rarely involve caregivers.

Objective: To develop and assess the usability and acceptability of a web-based advance care planning (ACP) decision aid named “My Voice”, tailored for patients with heart failure and their caregivers.

Methods: The study team and advisory board co-developed the content for both patient and caregiver modules in “My Voice”. Employing a mixed methods approach, we iteratively tested usability and acceptability, incorporating feedback from patients, caregivers, and healthcare providers.

Results: We interviewed 30 participants (11 patients, 9 caregivers, and 10 healthcare providers). Participants found the website easy to navigate, with simple and clear content facilitating communication of patients’ values and goals. They also appreciated that it allowed them to revisit their care goals periodically. Feedback prompted revisions to enhance user-friendliness for older patients, reduce wordiness, and increase empathy. The website met usability thresholds for all participant groups. Patients and caregivers’ ratings met acceptability thresholds for all items; healthcare providers’ ratings met acceptability thresholds for 11 of the 15 items.

Conclusions: “My Voice” shows promise as a tool for patients with heart failure to initiate and revisit ACP conversations with providers and caregivers. We will evaluate its efficacy in improving patient and caregiver outcomes in a randomized controlled trial. Clinical Trial: Not applicable

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Chetna Malhotra[1, 2]

Alethea Yee[1, 3]

Chandrika Ramakrishnan[1]

Sanam Naraindas Kaurani[1]

Ivy Chua[1]

Joshua Lakin[4]

David Sim[5]

Iswaree Balakrishnan[6]

Vera Goh Jin Ling[7]

Huang Weiliang[8]

Ling Lee Fong[9]

Kathryn I. Pollak[10]

[1] Lien Centre for Palliative Care, Duke-NUS Medical School, Singapore

[2] Program in Health Services and Systems Research, Duke-NUS Medical School, Singapore

[3] National Cancer Centre Singapore, Singapore

[4] Dana-Faber Cancer Institute, Boston, USA

[5] National Heart Centre Singapore, Singapore

[6] Sengkang General Hospital, Singapore

[7] Singapore General Hospital, Singapore

[8] Changi General Hospital, Singapore

[9] Khoo Teck Puat Hospital, Singapore

[10] Duke University School of Medicine, USA

Corresponding author

Asst Prof Chetna Malhotra

Duke-NUS Medical School

8 College Road, Singapore 169857

Email: chetna.malhotra@duke-nus.edu.sgchetna.malhotra@duke-nus.edu.sg

Phone number: 65165692

Fax number: 62217372

Abstract

Background & objective

Web-based advance care (ACP) interventions offer a promising solution to improve ACP engagement. However, there is lack of web-based ACP decision aids tailored for patients with heart failure, incorporating mechanisms to revisit patients’ care goals, and rarely involve caregivers. To develop and assess the usability and acceptability of a web-based advance care planning (ACP) decision aid named “My Voice”, tailored for patients with heart failure and their caregivers.

Methods

The study team and advisory board co-developed the content for both patient and caregiver modules in “My Voice”. Employing a mixed methods approach, we iteratively tested usability and acceptability, incorporating feedback from patients, caregivers, and healthcare providers.

Results

We interviewed 30 participants (11 patients, 9 caregivers, and 10 healthcare providers). Participants found the website easy to navigate, with simple and clear content facilitating communication of patients’ values and goals. They also appreciated that it allowed them to revisit their care goals periodically. Feedback prompted revisions to enhance user-friendliness for older patients, reduce wordiness, and increase empathy. The website met usability thresholds for all participant groups. Patients and caregivers’ ratings met acceptability thresholds for all items; healthcare providers’ ratings met acceptability thresholds for 11 of the 15 items.

Conclusion

“My Voice” shows promise as a tool for patients with heart failure to initiate and revisit ACP conversations with providers and caregivers. We will evaluate its efficacy in improving patient and caregiver outcomes in a randomized controlled trial.

Key words: Advance care planning, decision aid, website, heart failure, usability, acceptability

1. Introduction

Advance care planning (ACP) is a process to support individuals in understanding and sharing their values, goals, and preferences regarding medical care.[1] Systematic reviews by our team reveal that while ACP may not consistently result in goal-concordant care for patients,[2] improve their quality of life, or reduce healthcare expenditures, it can enhance communication of patient values and goals with healthcare providers and caregivers or surrogate decision-makers.[3,4] This, in turn, equips patients, caregivers, and healthcare providers to be better prepared for making in-the-moment healthcare decisions, emphasizing "preparation" rather than "planning" as an objective for ACP.[5] This emphasis on preparation is crucial, considering that most patients and caregivers are often unprepared for making these decisions.[6]

Despite these acknowledged benefits, ACP completion rates remain low globally.[7-9] Of particular concern are patients with conditions characterized by unpredictable clinical trajectories, such as heart failure, where prognostication remains challenging, resulting in postponement or avoidance of ACP conversations.[10,11] The low uptake of ACP, despite recommendations by international bodies such as the American Heart Association, raises significant concerns.[12] Another factor contributing to the low uptake is the substantial time and effort required for ACP conversations and documentation, often dissuading clinicians from initiating them.[13-15] Patients themselves may lack the readiness, initiative, and knowledge to initiate these conversations.[16-19] Most notably, even when ACP conversations happen, they are conducted as a one-time occurrence rather than part of an ongoing process.[20] Our previous research has revealed that patients' care goals change over time, thus limiting the value of one-time ACP conversations, and requiring that ACP conversations be revisited periodically.[21-24]

To enhance ACP completion rates among patients with heart failure and foster a truly patient-centered approach, it is crucial to empower patients to initiate ACP conversations with their caregivers and healthcare providers. ACP decision aids offer a promising solution, preparing patients for these conversations while alleviating the time burden for clinicians. While these web-based decision aids hold promise for enabling periodic patient-driven revisions and providing access to the latest updates on patients' evolving care goals, this dynamic and beneficial feature has not yet been empirically tested.

Despite the potential benefits, a scoping review of 11 web-based ACP decision aids for patients identified only two applicable for patients with heart failure, with only one specifically tailored for this group.[25,26] Moreover, none of these decision aids incorporated mechanisms to promote a systematic reconsideration of patients' care goals. Most existing ACP decision aids also do not encourage the active involvement of caregivers in the ACP process, simply coaching patients to engage with them.[27-30] The latter is particularly pertinent given the crucial role caregivers play in the decision-making process in many settings including Singapore, where this study is based.[31]

To address these gaps, we developed a web-based ACP decision aid called "My Voice", tailored for patients with heart failure and their caregivers. This paper aims to present the development process, and data on usability and acceptability among patients, caregivers, and healthcare providers. We hypothesized that "My Voice" would meet a *priori* standardized cut-off of 68 on the system usability scale, and that at least 70% of the participants would rate it as acceptable (good/excellent or agree/strongly agree) on all items assessing acceptability.

2. Material and Methods

2.1 "My Voice" website development

Between April 2022 and May 2023, we engaged in an extensive process involving literature reviews, examining existing ACP decision aids, and consultations with a study team comprising diverse experts including health services researchers, cardiologists, palliative care physicians, social workers, communication coaches, and information technology professionals. We also established a study advisory board consisting of patient representatives and healthcare providers trained to conduct ACP conversations and gathered their inputs regarding content and structure for the interactive web-based application “My Voice.” Guided by the COM-B model for behaviour change,[32] “My Voice” aimed to improve patients’ capability for engaging in ACP conversations, creating opportunities for them to have these conversations and revisit them periodically, and motivating them to do so.

A professional production house produced narration-style videos featuring healthcare providers from the study team. The website content and videos were initially developed in English and subsequently professionally translated into two local languages (Mandarin and Malay) to ensure inclusivity and accessibility. Upon completion of the content development phase, we developed the initial prototype of “My Voice”. To ensure the security of participants’ identifiable information, we incorporated password protection and a two-factor authorization process. The research team obtained relevant institutional approvals at all stages of web application development.

2.1.2 Description of “My Voice”

“My Voice” includes patient and caregiver modules. The patient module consists of a series of educational videos lasting 1-2 minutes each, organized into five steps - 1) Learn about heart failure; 2) Think about what is important to you; 3) Why and how to choose a spokesperson; 4) Speak to your doctor about what is important to you; and 5) Revisit My Voice.

In addition to the videos, Step 1 includes a knowledge quiz. Step 2 incorporates questions to elicit patient values and goals (referred to as value clarification questions), which were based on the serious illness conversation guide.[33] Step 3 provides fields for nominating up to two surrogate decision makers, known locally as the nominated healthcare spokespersons. Upon completion of Step 5, the patients’ responses to the value clarification questions and the details of their spokesperson(s) are automatically populated into a summary document called the “My Voice” document. Patients can view and edit the document before it is saved on the website. The website then triggers automated emails and phone text messages containing the document to both patients and their designated surrogate decision maker(s). Patients and their designated surrogate decision maker(s) can also view and print the document anytime through the website. **Figure 1** highlights selected pages from the “My Voice” website.

The caregiver module includes educational videos lasting 1-2 minutes structured into three steps - 1) Learn about heart failure; 2) Talk to your loved one; and 3) Support your loved one. Like the patient module, Step 1 incorporates a knowledge quiz. At the end of the module, caregivers have the option to view the patient’s “My Voice” document.

2.2 Usability testing

2.2.1 Study design and setting

We iteratively revised the website’s content and structure, gathering feedback from participants using a mixed-methods design. Between May and August 2023, we recruited a convenience sample of patients with heart failure, their caregivers, and healthcare providers, from four public hospitals in Singapore. We recruited patients from outpatient clinics and wards, based on the following inclusion criteria: a) adults aged 21 years or above, b) diagnosed with heart failure, c) Singaporean or permanent resident, d) able to understand either English, Mandarin, or Malay, and e) willing to use a web-based intervention. Caregivers were eligible if they were: a) adults aged 21 years or above, b) providing informal care or ensuring the provision of care, and/or serving as the main decision-maker for the heart failure patients with no expectation of financial compensation, c) able to understand either English, Mandarin or Malay, and d) willing to engage with a web-based intervention. Healthcare providers recruited were those caring for patients with heart failure. All participants were briefed on the study’s purpose and procedures and provided written informed consent prior to the start of study procedures. All procedures were performed in compliance to the institutional guidelines and the study received ethics approval from the Central Institutional Review Board, Singapore (Ref No 2022/2482).

2.2.2 Study procedures

Participants viewed “My Voice” in their desired language (English, Mandarin, or Malay) on a tablet device and responded to a qualitative interview and a brief survey. Patients and caregivers provided feedback on their respective modules while healthcare providers provided feedback on both modules. Research staff facilitated website navigation and ensured the participants viewed all steps**.**

Qualitative interviews

Trained research staff (IC and SNK) conducted face-to-face qualitative interviews using a guide developed based on concepts from the user-experience model[34] . The guide comprised of open-ended questions and elicited participants’ perceptions and satisfaction with the design and content of the website and obtained feedback for enhancement. Participants were given time to explore and navigate each page of the website. Subsequently, they were prompted to provide feedback on the website’s navigational ease and the clarity of on-page explanations. Participants were asked to assess the comprehensibility of the value-clarification questions and whether they could easily select their preferred answers from a list of potential response options for these questions. Their suggestions for refining the value clarification questions and the response options were elicited. Lastly, participants were asked about their overall impressions of the website, its perceived usefulness, aspects they liked most or least, and recommendations for improvement. Participant responses were audio-recorded for analysis. The interviews lasted between 30-80 minutes.

Survey

Following the qualitative interview, participants completed a survey collecting demographic information including age, gender, ethnicity, marital status, educational level, and, for patients, the duration of heart failure. Participants also responded to questions assessing usability and acceptability. Usability was evaluated by the 10-item system usability scale (SUS); each item was rated on a 5-point Likert scale (Strongly disagree to strongly agree).[35,36]

We adapted questions from the acceptability rating scale for decision aids.[37] Patients rated 12 items, caregivers assessed 3 items, and healthcare providers evaluated 15 items. For patients and caregivers, each item was rated on a 4-point Likert scale ranging from poor to excellent (score: 1-4). Healthcare providers used a 5-point Likert scale ranging from Strongly disagree to strongly agree (score: 1-5). Example items included, ‘It will be easy for me to use “My Voice” for introducing ACP to my patients’ and ‘This “My Voice” website is better than how I usually go about conducting ACP’.[37] Lastly, patients and caregivers rated the length (too long, too short, just right) and amount of information (too much, too little, just right) for “My Voice”. The destudy has been reported

2.3 Data analysis

We described participants’ demographic and health status characteristics and translated feedback from Mandarin and Malay interviews to English. CR and IC used qualitative description methodology to categorize the feedback from qualitative interviews into themes and sub-themes.[38] We also calculated the total SUS score as sum of each item score and rescaled it within the range of 0 to 100. A higher SUS score signified greater usability, and a score greater than 68 indicated good usability.[35,36] We then present the total SUS scores for each participant group and overall sample. For each item on the acceptability scale, we calculated the proportion of patients and caregivers responding as good or excellent and healthcare providers rating as agree or strongly agree.

3. Results

3.1 Demographic and health status characteristics

Of the 44 participants approached, 30 consented (overall response rate 68%; patients: 46%, caregivers: 90%, healthcare providers: 91%). These included 11 patients, 9 caregivers, and 10 healthcare providers. All healthcare providers (n=10), 6 patients, and 5 caregivers provided feedback for the English version, 4 patients and 3 caregivers gave feedback for the Mandarin version, and 1 patient and 1 caregiver commented on the Malay version. Participants’ mean age was 49 years (SD 14.9) and 60% were females. Participant characteristics are in **Table 1.**

3.2 Qualitative interviews and iterative re-design

Table 2 presents example quotes illustrating feedback obtained, and **Table 3** outlines participants' suggestions for improvement alongside the corresponding revisions made. The following three themes describe participants' feedback and suggestions along with the revisions made.

User experience of navigating the website

Many participants provided positive feedback about the ease of navigation and layout of the website. Patients, caregivers, and healthcare providers described the interactive features as easy to use and appreciated the simple layout of the website. However, two healthcare providers anticipated that older patients may have difficulty reading extensive text due to poor eyesight, scrolling down the webpage, and navigating the site.

To address these concerns and enhance user experience and accessibility for older patients, we added a note on the expected time to complete the website and a progress bar to allow users to track their progress. We also increased the frequency of navigational buttons such as the "Submit My Voice document", increased the font size and changed the font colour to improve readability. Lastly, within the help section, in addition to allowing the participants to type their queries, we incorporated a drop-down list for them to select from. This enhanced the ease of reaching out to the research team in case of difficulties.

Acceptability of website content and duration

Patients, caregivers, and healthcare providers found the language clear and straightforward with "no jargon". However, two healthcare providers suggested reducing the wordiness of the webpage. Most participants also found the duration of the website to be suitable although one provider recommended adding a pause button for patients who may need breaks or prefer to complete the website in smaller segments.

Some patients expressed that the quiz explanations were overly direct and demoralizing. Given the discomfort surrounding the topic of death and dying, they suggested incorporating elements of hope to make the website more comforting.

We received extensive feedback about the values clarifying questions and their response options. One healthcare provider recommended adding details about caregiving arrangements and clarifying terms such as “physically comfortable” or “at peace”. Another healthcare provider highlighted that being dependent on others did not equate to being a burden on the family. Participants also had challenges understanding and responding to a question asking patients’ willingness to trade-off between quality and length of life, despite multiple iterations and revisions. These revisions aimed to clarify the question, prompting patients to imagine a situation where such a trade-off would occur. We also changed the initial 3-point response to a 2-point response option, excluding the choice to prioritize both aspects simultaneously. Participants described this question as vague and difficult to relate to.

In response to these concerns, we shortened the introduction section of the website and reduced the wordiness of each webpage. To enable participants to complete the website in multiple sessions, we implemented a feature that displays their previous responses if they have not submitted their “My Voice” document. We also simplified the phrasing of key terms and modified the explanations for the quiz responses to be more empathic, acknowledging patients’ desire for a cure and emphasizing that symptoms can be managed even though heart failure is incurable. We clarified the response options for the value-clarification questions by making them more specific and split up the initial option of “being dependent on others for their daily activities and being a burden on their family” into two separate response options. We removed the question assessing the trade-off on quality and length of life.

Usefulness in understanding patient's values and goals

Many healthcare providers noted that the website could complement and enhance existing ACP processes by helping patients reflect on their values and care goals, thereby preparing them for the challenging in-person ACP conversations ahead of time. This preparation could potentially save time during dedicated clinic appointments for ACP conversations.

Patients and caregivers also found the website useful as it encouraged them to communicate with each other. Caregivers particularly appreciated that patients' "My Voice" document could be updated periodically to reflect their changing care goals.

3.3 Survey results

The overall mean SUS score of 74 (SD 14.8; range: 42.5 to 95), with mean scores in each of the three groups of participants exceeding the minimum cut-off score of 68, indicated good usability. Specifically, 70% of participants reported SUS scores above 68, which included 64% of patients, 78% of caregivers, and 70% of healthcare providers. (**Table 4).**

Patients highly rated the way information was presented in the 5 steps, with over 80% of patients rating each of the 12 items about acceptability as good or excellent. Likewise, over 88% of caregivers rated each of the 3 items about acceptability as good or excellent **(Table 5**). Except for one patient who found the length of the website to be "too long", all remaining patients and all caregivers found it to be "just right". Similarly, most patients and caregivers (90%) found the amount of information presented to be "just right". Over 70% of healthcare providers rated 11 of the 15 items as strongly agree or agree **(Table 5)**.

4. Discussion and Conclusion

4.1 Discussion

Study findings confirm the usability and acceptability of “My Voice” for patients with heart failure. Most participants provided positive feedback regarding their experience with “My Voice”. They found the website easy to navigate, its duration and content acceptable, and valuable in conveying and comprehending patient values and goals. The mean usability scores exceeded the designated threshold (68 and above), both overall and within each participant group. Additionally, the acceptability thresholds (70% or above) were met for all items for patients and caregivers, and 73% of the items for healthcare providers.

Given that a significant proportion of patients with heart failure are older with lower literacy levels,[39] feedback primarily focused on enhancing the website accessibility for this demographic. Suggestions included simplifying the login process, improving the layout, reducing wordiness, increasing font size, and simplifying terminology. Moreover, some patients expressed surprise upon learning about the incurable nature of their illness, indicating that they had not engaged in serious illness conversations with their healthcare providers. Our previous studies have also shown similar findings.[40,41]

Patients and caregivers rated “My Voice” to be both acceptable and usable. However, while, healthcare providers rated its usability highly, they provided lower ratings to certain aspects of acceptability. These included suggestions that “My Voice” could potentially be more effective and replace the current ACP facilitation method. It is important to note that “My Voice” is primarily a patient preparation tool intended to complement, rather than replace, the patient-provider conversations. Therefore, the concerns raised are not unexpected given its supplementary role in the process.

While web-based ACP interventions are increasingly prevalent in the literature, our intervention is innovative in several respects. *Firstly*, it incorporates structured mechanisms to encourage frequent revisits to “My Voice”, through educating patients and caregivers about its importance and sending reminders to them via phone. Our previous research revealed that ACP conversations typically occur as one-time events despite evolving patient preferences. [20-24] “My Voice” thus addresses this current gap in ACP implementation by facilitating ongoing reflection on values and goals and fostering periodic ACP conversations with healthcare providers. *Secondly*, it is tailored specifically to patients with heart failure, featuring educational videos and a quiz regarding their illness. This targeted education not only imparts urgency but also provides the context for patients to reflect on their values and goals. *Thirdly*, “My Voice” seamlessly integrates active caregiver involvement into the ACP process. Not only do we coach patients to choose a surrogate decision maker and engage with them, but our dedicated caregiver module educates the chosen surrogate about the patient’s illness and guides them on how to communicate with the patient and the healthcare providers. This caregiver module also facilitates the sharing of the patient’s “My Voice document” with the surrogate. This approach enhances the caregiver’s understanding of patient values and goals, preparing them to make end-of-life decisions for their loved ones. Importantly, caregivers in our usability study appreciated the “My Voice” website's unique features, particularly its capability for patients to periodically update their goals and share them with their surrogates. *Lastly*, the inclusion of content in three different languages enhances the accessibility of “My Voice” to a broader range of ethnic and language groups, promoting inclusivity and ensuring that individuals from diverse backgrounds can effectively engage in the ACP process.

“My Voice” is one of the first web-based ACP interventions for patients with heart failure in the Asian context. The study’s strength lies in its utilization of a mixed methods design to gather participant feedback, agile methodology implementation to enhance user satisfaction, and inclusion of different ethnic and language groups across multiple sites. However, there are some limitations.

The response rate from patients was low (46%), partly attributed to older age of many participants approached and their reluctance to engage in web-interventions. Additionally, although the sample size was adequate to achieve thematic saturation, it was small to discern variations across age, gender, and other sociodemographic.

4.2 Conclusion

The findings support the usability and acceptability of the web-based ACP intervention, “My Voice”, among patients with heart failure and their caregivers. Participants largely endorsed the interactive website as a valuable tool for communication and understanding patients’ values and goals, offering constructive feedback to enhance its user-friendliness for older patients.

4.3 Practice implications

“My Voice” is a usable and acceptable tool for empowering patients to engage in ACP conversations with their caregivers and healthcare providers. The efficacy of the “My Voice” website in improving patient and caregiver outcomes is being assessed through a randomized controlled trial.

Declarations

Ethics approval and consent to participate

The study was approved by the SingHealth Centralized Institutional Review Board Ref No 2022/2482. Written informed consent was obtained from all participants involved in the study.

Consent for publication

Not applicable

Availability of data and materials

The data used during the current study are available from the corresponding author on reasonable request.

Competing Interest

The authors declare they have no competing interests.

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Author contributions

CM: Conceptualization, methodology, funding acquisition, supervision, writing-original draft. **AY:** Conceptualization, Validation, writing-review, and editing. **CR**: Data curation, formal analysis, validation, writing-original draft, validation, visualization. **SK**: Project administration, investigation, formal analysis. **IC**: Investigation, formal analysis. **JL**: Writing-review and editing. **DS, IB, VGJL, HW, LLF:** Project administration, resources, writing-review and editing. **KIP:** Supervision**,** writing-review and editing. All authors read and approved the final manuscript.

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Abbreviations

ACP: Advance care planning

DA- Decision aid

SUS: System usability score

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TABLES

Table 1: Participant characteristics (n=30)

Item	**Patients (n = 11)**	**Caregivers (n = 9)**	**Healthcare Providers (n = 10)**
Age, years mean (SD)	60.7 (13)	44.9 (15.4)	39.8 (6.1)
Gender, n (%)			
Male	7 (64)	2 (22)	3 (30)
Female	4 (36)	7 (78)	7 (70)
Ethnicity, n (%)			
Chinese	8 (73)	7 (78)	
Malay	2 (18)	1 (11)	
Indian	1 (9)	0 (0)	
Other	0 (0)	1 (11)	
Marital Status, n (%)			
Married	8 (73)	6 (67)	
Widowed	1 (9)	0 (0)	
Never married	2 (18)	3 (33)	
Education, n (%)			
Secondary school	5 (46)	4 (44)	
Junior college/Polytechnic/Diploma/Vocational	2 (18)	2 (22)	
University and above	4 (36)	3 (34)	
Duration of heart failure, n (%)			
< 5 years	5 (45.5)		
5 to < 10 years	5 (45.5)		
10 years & above	1 (9)		
Relationship with patient, n (%)			
Spouse		1 (11)	
Child (son/daughter)		7 (78)	
Others (relative)		1 (11)	
Profession, n (%)			
Physician			4 (40)
Nurse			3 (30)
Allied healthcare professional			3 (30)
Experience with treating heart failure patients, n (%)			
Less than 5 years			1 (10)
5 to < 10 years			5 (50)
10 years & above			4 (40)
Advance care planning (ACP) training			

Yes			6 (60)
No			4 (40)

Table 2: Participant feedback on “My Voice” website

Theme 1- User experience of navigating the website				
Sub-theme	**Patients**	**Caregivers**	**HCPs**	**Selective positive quotes**
Ease of navigation	√√×*	√√√	√√×	*“Easy and straightforward. Quite nice to use”* (UAT25, Patient) *“I think it is something special, but I don’t know if as a patient, I will know how to use this (for the aged) … I think now also, I need someone to guide me”* (UAT29, Patient) *“Like most interfaces used in Singapore, it’s not particularly difficult…overall quite easy to use…“I am quite sure that they (elderly) will need somebody to go through with them, for the elderly patients”* (UAT05, Cardiologist)
Simple layout	√√√	√√√	√√√	*“My favourite part is the document that is generated with the spokesperson. It’s written very clearly”* (UAT24, Caregiver) *“Not too cluttered, quite clearly delineated”* (UAT05, Cardiologist)
Theme 2- Acceptability of website duration and content				
Sub-theme	**Patients**	**Caregivers**	**HCPs**	**Selective positive quotes**
Ease of understanding	√√√	√√√	√√√	“*Very easy, very simple to understand”* (UAT29, Patient) *“I think the options listed inside are easy to understand … Questions quite straightforward”* (UAT01, ACP Facilitator) *“Videos did not contain any jargon, so it’s quite clear”* (UAT05, Cardiologist)
Informative	√√	√√√	√√√	“*Very succinct, it tells me exactly what I need to do*” (UAT25, Patient) “*I think it’s good that we have all this background learning, at least we know and can be more educated…..[learnt that] it is important that we get the information directly from them (patient) [rather than making assumptions]”* (UAT20, Caregiver) *“Enough information but I think the patient may need some time to digest it*” (UAT01, HCP, ACP Facilitator)

				“*I like all the videos thus far. They are very concise, not too long, not too short, but every point that is important I guess it’s all mentioned*” (UAT03, Medical social worker) “*There is definitely enough information to help patients with advanced care planning*” (UAT05, Cardiologist)
Suitable duration	√√√	√√√	√√	“*The length of My Voice is just right*” (UAT13, Patient)
Theme 3- Usefulness in understanding patient’s values and goals				
Sub-theme	**Patients**	**Caregivers**	**HCPs**	**Selective positive quotes**
Complementary to ACP			√√	“*I think this website is in a way like helping the patient to do the first part [of ACP, which is the initial meeting where facilitators get them to think about things that they want before starting the ACP process] to get them to think about it before they come and really start to think in details what are the treatments the want”* (UAT01, ACP Facilitator) “*It’s more effective to reach the mass rather than in every admission or outpatient when we refer to ACP coordinator*” (UAT03, Medical social worker) *“[because it is so streamlined], it may be more efficient than a traditional way of ACP [where patients tend to sidetrack]”* (UAT05, Cardiologist)
Understanding values and goals	√√√	√√√	√	“*It addresses the issue (by allowing the patient to let their preferences be known) especially when my husband does not want to listen. He says, ‘don’t think about it, it won’t happen’ so if there is an additional step that can tell me what to do when my husband doesn’t want to listen to me that will be great”* (UAT25, Patient) “*It is really true that based on their condition, they might change. It’s not always that – and then human heart or mind may be a bit fickle, or they might change based on their condition. So, this (frequent updates) is quite a good way*” (UAT20, Caregiver) *“It’s definitely going to be useful for patients because…it’s easier for them to just sit down and think about it. The traditional way sometimes they arrive, and they don’t even know what kind of conversation they are going to have with you, and they may not be*

				ready for it" (UAT05, Cardiologist)
Saves time			√	*"This will cut down a lot of professional's time and caregiver's time [during the ACP process]"* (UAT03, Medical social worker)

*√ Indicates positive response and x negative response. Number of √ and × indicates strength of the responses (√√√ strong to √ mild)

Table 3: Participant suggestions for improving "My Voice" website

Theme	**Suggestions**	**Changes made to "My Voice"**
User experience of navigating the website	*"I think the layout for most pages it's fine, except for those on the boxes right, with a solid background of blue or dark blue, the white fonts could be bolder, I think that would be more clear to the respondents"* (UAT03, Medical Social worker)	Replaced red text on blue background with yellow text on blue background for better readability**.**
	A little bit lengthy, especially for the elderly patients whose eyesight is not so good … The shorter the better. Otherwise, they have a lot to scroll, and read, and their attention span is already so short" (UAT10, Nurse)	Added expected time to completion of the website - 'This program will take approximately 30 minutes to complete'. Reduced the length of on-page explanation before the value-clarification questions. Added a colour coded progress bar on the pages to track completion
Acceptability of website content and duration	*"The options in the respective pages… can streamline them… can further divide them like personal, family, work, or finances"* (UAT03, Medical Social worker)	Merged similar terms to shorten the text in responses options for the value-clarification questions (e.g. including "pain" under "symptoms" instead of 2 separate fields) Added explanations in brackets for terms that are not immediately understandable such as: Make a legacy (something that is passed on, monetary or non-monetary)" and "Being cared for at home, rather than in an institution (e.g. hospital)"

	Don’t just give the bitter truth, add some element of sweetness. Give some hope” (UAT26, Patient)	Rephrased explanations for answers to the knowledge quiz to be more empathetic e.g. Original text “Heart failure is a serious condition that can shorten life. For some patients, heart failure is stable for a long time then gets worse. Others have a gradual decline over time.” Revised to “We wish heart failure got better over time. Unfortunately, heart failure is a serious condition. For some patients, heart failure is stable for a long time then gets worse. Others have a gradual decline over time.”
	“Some thoughts about the Step 4 when it mentions about the medical records, patients may not know how to go about. They may have queries about this part, like how do I document, who do I approach” (UAT01, ACP Facilitator)	In the patient module, integrated the step for documenting patient preferences in medical records with the step to speak to your doctor (step 4).
	You will need to use simple words because sometimes when they age, complicated words they won’t understand” (UAT29, Patient)	Replaced wordy introduction with simple bullet points for describing the steps involved. Used simpler terms (e.g. “spokesperson 1” and “spokesperson 2” instead of “primary spokesperson” and “secondary spokesperson”)

Table 4: System usability scores by participant group

	Patients (n = 11)	Caregivers (n = 9)	Healthcare Providers (n = 10)	Overall (n = 30)
System usability score				
Range	47.5-92.5	50-95	42.5-95	42.5-95
Mean (SD)	72.3 (15.2)	76.4 (15.3)	73.8 (15.2)	74 (14.8)
System usability score category	n (%)	n (%)	n (%)	n (%)
>87	2 (18)	2 (22)	3 (30)	7 (33)
69-87	5 (46)	5 (56)	4 (40)	14 (47)
50-68	3 (27)	2 (22)	2 (20)	7 (23)
<50	1 (9)	0	1 (10)	2 (7)

Table 5: Acceptability ratings by patients, caregivers, and healthcare providers

Item	**% rating good/ excellent**
Patient acceptability (n=11)	
About heart failure (step 1)	90.9
Thinking about goals for end-of-life care (step 2)	90.9
Understanding what is important to you when it comes to your health	100
Questions on what makes life meaningful to you	100
Questions on -when it gets to my health getting worse, what worries me most	81.8
Questions on- choosing a preferred treatment	90.9
Questions on what matters most to you and choosing top 3 goals	81.8
Ranking the order of the top 3 goals	81.8
Choosing a healthcare spokesperson (step 3)	81.8
Document what is important to you in medical record	90.9
Discussing with the doctor about “My Voice” document (step 4)	81.8
Revisiting “My Voice” document periodically (step 5)	81.8
Caregiver acceptability (n=9)	**% rating good/ excellent**
About heart failure (step 1)	87.5
Talking to your loved ones about goals for end-of-life care (step 2)	100
Supporting your loved ones (step 3)	87.5
Healthcare provider acceptability (n=10)	**% rating agree/ strongly agree**
It will be easy for me to use **My Voice** for introducing advance care planning (ACP) to my patients.	80
It is easy for me to understand **My Voice**.	90
It will be easy for me to use **My Voice** website for advocating advance care planning.	80
The results of using **My Voice** website will be easy to see (increase in self-administered ACP-My Voice document)	80

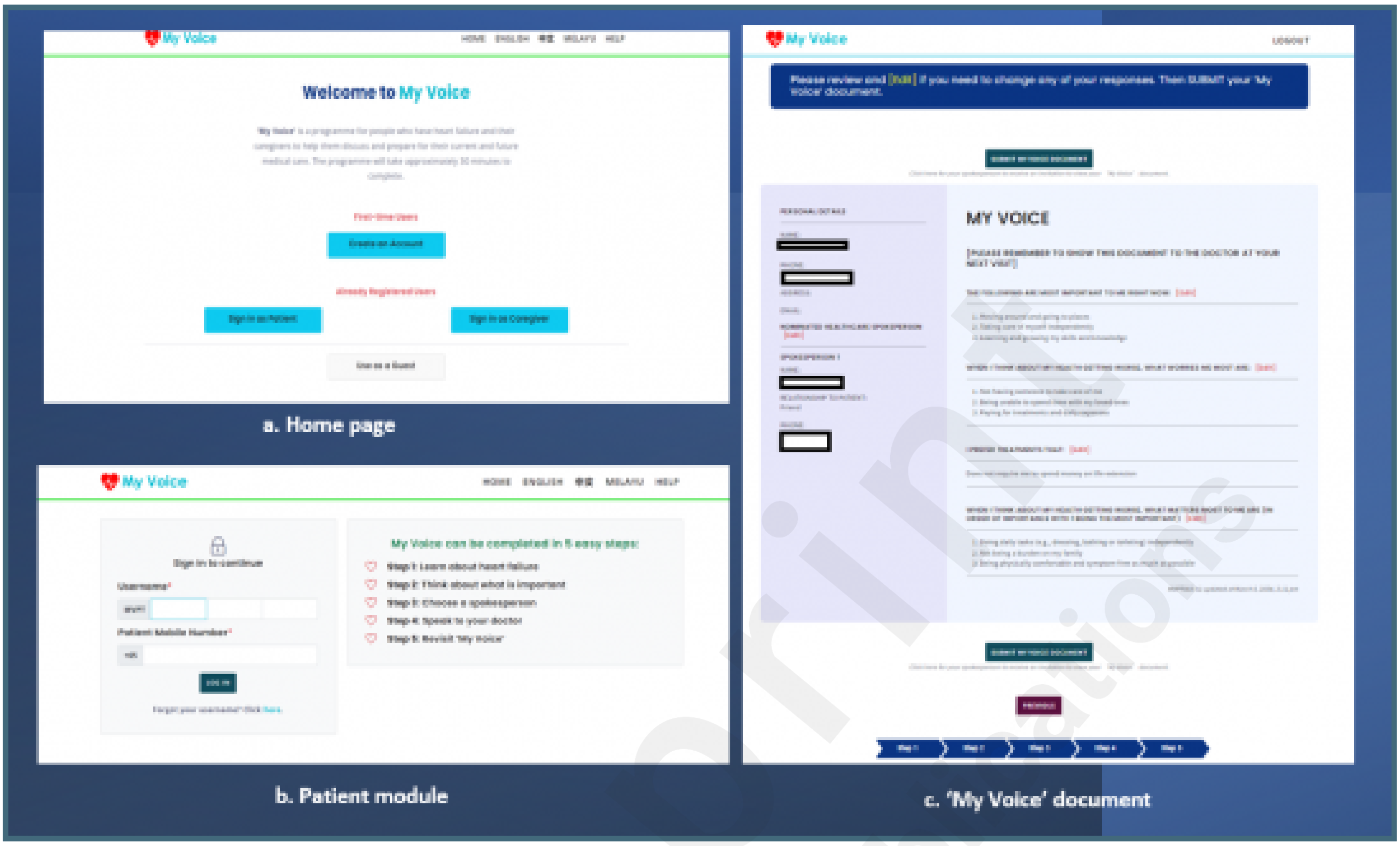
Item	**% rating good/ excellent**
This **My Voice** website is better than how I usually go about conducting ACP	38
This **My Voice** website is compatible with the way I think things should be done.	60
The use of **My Voice** website is more cost-effective than my usual approach to conducting ACP	60
Compared with my usual approach, **My Voice** website will result in my patients making more informed decisions.	80
Using **My Voice** website will save me time.	100
This **My Voice** website is a reliable method of helping patients do an ACP.	70
Pieces or components of the **My Voice** website can be used by themselves.	70
This type of **My Voice** website is suitable for helping patients make value laden choices.	90
This **My Voice** website complements my usual approach to conducting ACP.	75
Using this **My Voice** website does not involve making major changes to the way I usually do things.	50
There is a high probability that using this **My Voice** website may cause / result in more benefit than harm.	70

Figure 1: Selected pages from "My Voice" website

Supplementary Files

Figures

Selected pages from my voice website.



Welcome to My Voice

a. Home page

My Voice can be completed in 5 easy steps:

- Step 1: Learn about heart failure
- Step 2: Think about what is important
- Step 3: Choose a spokesperson
- Step 4: Speak to your doctor
- Step 5: Revisit 'My Voice'

b. Patient module

Please review and [Edit] if you need to change any of your responses. Then SUBMIT your 'My Voice' document.

[redacted]

[redacted]

[redacted]

[redacted]

MY VOICE

[PLEASE REMEMBER TO SHOW THIS DOCUMENT TO THE DOCTOR AT YOUR NEXT VISIT]

c. 'My Voice' document